

## AMENDMENTS:

### AMENDMENTS TO THE CLAIMS:

5 This listing of claims will replace all prior versions, and listings, of  
claims in the application.

Please amend claims 1, 9, 15, 16 and 30, as follows:

- 1 (Currently Amended). An apparatus for frequency control, ~~control of a~~  
10 ~~resonator, the resonator adapted to provide a first signal having a resonant frequency;~~  
the apparatus comprising:  
a reference resonator, the reference resonator adapted to provide a first  
signal having a resonant frequency;  
an amplifier coupled ~~coupleable~~ to the reference resonator; and  
15 a frequency controller coupled to the amplifier and coupled to the  
reference ~~coupleable to the~~ resonator, the frequency controller adapted to modify the  
resonant frequency of the reference resonator in response to at least one variable of a  
plurality of variables.
- 20 2 (Original). The apparatus of claim 1, wherein the plurality of variables comprise  
temperature, fabrication process, voltage, and frequency.
- 3 (Original). The apparatus of claim 1, wherein the amplifier further comprises a  
negative transconductance amplifier.  
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- 4 (Original). The apparatus of claim 3, wherein the frequency controller is further  
adapted to modify a current through the negative transconductance amplifier in  
response to temperature.
- 30 5 (Original). The apparatus of claim 4, wherein the frequency controller further  
comprises a current source responsive to temperature.

6 (Original). The apparatus of claim 5, wherein the current source has one or more configurations selected from a plurality of configurations, the plurality of configurations comprising CTAT, PTAT, and PTAT<sup>2</sup> configurations.

5 7 (Original). The apparatus of claim 3, wherein the frequency controller is further adapted to modify a current through the negative transconductance amplifier to select the resonant frequency.

8 (Original). The apparatus of claim 3, wherein the frequency controller is further  
10 adapted to modify a transconductance of the negative transconductance amplifier to select the resonant frequency.

9 (Currently Amended). The apparatus of claim 3, ~~claim 14~~, wherein the  
frequency controller is further adapted to modify a current through the negative  
15 transconductance amplifier in response to a voltage.

10 (Original). The apparatus of claim 3, wherein the frequency controller is further adapted to modify a transconductance of the negative transconductance amplifier in response to fabrication process variation.

20 11 (Original). The apparatus of claim 3, wherein the frequency controller is further adapted to modify a current through the negative transconductance amplifier in response to fabrication process variation.

25 12 (Original). The apparatus of claim 1, wherein the frequency controller further comprises a voltage isolator coupled to the resonator and adapted to substantially isolate the resonator from a voltage variation.

13 (Original). The apparatus of claim 12, wherein the voltage isolator comprises a  
30 current mirror.

14 (Original). The apparatus of claim 13, wherein the current mirror has a cascode configuration.

15 (Currently Amended). The apparatus of claim 1, wherein the reference resonator is one or more of the following resonators: selected from a group comprising: an inductor (L) and a capacitor (C) configured to form an LC-tank resonator; a ceramic resonator, a mechanical resonator, a microelectromechanical resonator, and a film bulk  
5 acoustic resonator.

16 (Currently Amended). An apparatus, comprising:  
a reference resonator, the reference resonator adapted to provide a first  
signal having a resonant frequency;  
10 a negative transconductance amplifier coupled to the reference  
resonator; and  
a temperature compensator coupled to the negative transconductance  
amplifier and to the reference resonator, the temperature compensator adapted to  
modify the resonant frequency in response to temperature.

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17 (Original). The apparatus of claim 16, wherein the temperature compensator is further adapted to modify a current through the negative transconductance amplifier in response to temperature.

20 18 (Original). The apparatus of claim 17, wherein the temperature compensator further comprises a current source responsive to temperature.

19 (Original). The apparatus of claim 18, wherein the current source further comprises:

25 a first transistor;  
a second transistor coupled to the first transistor;  
a diode coupled to the first transistor; and  
a resistor coupled to the second transistor.

30 20 (Original). The apparatus of claim 19, wherein the current provided by the current source is a function of a voltage across the diode and a resistance of the resistor, wherein the voltage and the resistance are temperature-dependent.

21 (Original). The apparatus of claim 19, wherein the first and second transistors are operable in strong inversion.

22 (Original). The apparatus of claim 18, wherein the current source further  
5 comprises:

a first transistor;  
a second transistor coupled to the first transistor; and  
a resistor coupled to the second transistor.

10 23 (Original). The apparatus of claim 22, wherein the current provided by the current source is a function of a voltage across the resistor, a resistance of the resistor, and respective sizes of the first and second transistor, wherein the voltage and the resistance are temperature-dependent.

15 24 (Original). The apparatus of claim 22, wherein the first and second transistors are operable at a subthreshold voltage.

25 (Original). The apparatus of claim 18, wherein the current source further  
comprises:

20 a plurality of transistors; and  
a resistor coupled to a transistor of the plurality of transistors.

26 (Original). The apparatus of claim 25, wherein the current provided by the current source is a function of a square of a voltage across the resistor, wherein the voltage is  
25 temperature-dependent.

27 (Original). The apparatus of claim 25, wherein a first set of transistors of the plurality of transistors are operable in strong inversion and a second set of transistors of the plurality of transistors are operable at a subthreshold voltage.

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28 (Original). The apparatus of claim 18, wherein the current source has one or more configurations selected from a plurality of configurations, the plurality of configurations comprising CTAT, PTAT, and  $PTAT^2$  configurations.

29 (Original). The apparatus of claim 18, wherein the current source is coupled through one or more current mirrors to the negative transconductance amplifier.

- 5 30 (Currently Amended). An apparatus, comprising:
- a reference resonator, the reference resonator adapted to provide a first signal having a resonant frequency;
  - a negative transconductance amplifier coupled to the reference resonator;
  - 10 a current mirror coupled to the negative transconductance amplifier; and
  - a current source coupled to the current mirror, the current source adapted to modify the resonant frequency of the reference resonator by varying a current through the current mirror and the negative transconductance amplifier in response to temperature.

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31 (Original). The apparatus of claim 30, wherein the current source has one or more configurations selected from a plurality of configurations, the plurality of configurations comprising CTAT, PTAT, and PTAT<sup>2</sup> configurations.

- 20 32 (Original). The apparatus of claim 31, further comprising a plurality of current sources coupled to the current mirror, the a plurality of current sources having at least two configurations selected from a plurality of configurations, the plurality of configurations comprising CTAT, PTAT, and PTAT<sup>2</sup> configurations.

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